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ABORTION IN HORSES

(Replaces OMAFRA Factsheet *Abortion in Horses,* Order No. 89-169)

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Abortion in horses may result from a variety of causes. Infectious agents, such as bacteria, viruses or fungi, may attack the fetus or its membranes, resulting in fetal death and expulsion. Other factors attributable to the mare, fetus or external forces may also cause loss of the embryo or fetus. These factors include twinning, hormonal deficiencies, congenital anomalies, ergot alkaloid toxicity or ingestion of tent caterpillar setae. Some of the more common causes are discussed below.

Normal horse pregnancy parameters include:

Gestation length:	330 to 340 days
Umbilical cord length:	36 to 84 cm[1]
Placental weight (thoroughbred):	5.7 ± 0.08 kg (about 12.5 lb) or 11% of the foal's body weight[1, 2]

INFECTIOUS CAUSES OF ABORTION

Over the past six years, infectious abortions have accounted for approximately one-third of all abortions diagnosed. Equine herpesvirus (EHV-1) is the major infectious agent, accounting for 18% of all abortion diagnoses[3].

Viral Abortion

Equine herpesvirus (EHV-1 abortion virus) is most often associated with abortions in mares, while herpesvirus EHV-4 (rhinopneumonitis virus) is usually associated with respiratory disease in young horses. Both subtypes have the potential to cause respiratory disease and abortion. Vaccines are available as aids to prevent abortion due to EHV-1 infections. The herpes family of viruses has the capacity to persist in the body of its host in a dormant state as an inapparent carrier after the primary infection. Months or years after the primary infection, the latent herpesvirus may again become manifest with renewed replication and with the potential for initiating new outbreaks of disease in its host as well as susceptible stable mates. Therefore, it is the existence of these latently infected carrier horses, from which the virus is re-activated by stress-induced circumstances and shed into the environment to infect other individuals, that initiates a new outbreak of the disease.

A fetus may become infected 20 to 90 days after its mother contacts the disease. Most abortions due to this virus occur between 8 and 11 months of gestation, although they may occur as early as 5 months. In some cases, the foal will be born alive at term and will die shortly after birth due to infection by the virus. The abortion rate may approach 100% in a herd of susceptible mares. The vaccines that are currently available are the best we have but are of questionable value in preventing abortion.

Equine arteritis virus (EAV) has the potential to cause abortion as well as the more commonly observed contagious respiratory disease and semen-shedding state in infected carrier stallions. No EAV-related abortions were diagnosed at the Animal Health Laboratory, University of Guelph, from 1998 to 2004[3].

Bacterial Abortions

Several species of bacteria have been incriminated as causative agents of equine abortion and sterility. The most common cause of bacterial abortion at present is organisms of the *Streptococci* group. Other bacteria frequently identified from aborted feti include *Leptospira*, *Nocardia*, *Klebsiella* and *Staphylococcal* species.

These agents gain entrance to the reproductive tract and travel to the uterus, causing infection of the fetal membranes, resulting in abortion. Retention of the placenta is often a sequel to bacterial abortion as is infection of the uterus (endometritis and/or metritis). Treatment of the mare is often required before she can be rebred successfully. It is a good practice to swab mares before rebreeding to determine if harmful bacteria are present in the uterus. Your veterinarian can provide advice on the need to lavage your mare's uterus with or without an antibiotic.

Leptospirosis

Leptospira infection in horses is manifested as either abortion or recurrent uveitis (moon blindness) in the horse. Leptospires are motile bacteria called spirochetes. The leptospires are grouped into serogroups, serovars and genotypes. The serovars *pomona, grippotyphosa, hardjo, bratislava, canicola* and *icterohaemmorhagiae* are the ones we are most interested in. Leptospires are very common in domestic and wild animals, and can also infect humans. In particular regions, there will be one or more maintenance hosts that serve as the reservoir for the infection. Leptospires will be transmitted to incidental hosts by shedding into the environment from a maintenance host. They can invade the mucous membranes and/or damaged skin and migrate to various body organs of an incidental host[4]. The maintenance hosts can be wildlife such as deer, raccoons and rodents.

Reports from Kentucky indicate that the genotype ***kennewicki*** of the *pomona* serogroup was responsible for 86% of the abortions while *grippotyphosa* was responsible for 8%[5]. Authors indicated that the raccoon is the maintenance host for *grippotyphosa*. The maintenance host for ***kennewicki*** has not been determined. The diagnosis of leptospirosis will often be one of exclusion.

Diagnosing the Infectious Agent

When trying to diagnose an infectious agent, veterinarians will collect paired sera taken three weeks apart as an essential for historical evidence of a recent infection. A fourfold change in titre to an organism in the paired sera would provide a presumptive diagnosis.

Demonstration of the organism in the placenta or antibodies to the organism in fresh placental tissue, fetal stomach contents, fetal serum, fetal aqueous humour or fetal viscera by fluorescent antibody techniques, silver staining or dark field microscopy for leptospirosis would provide more conclusive evidence[6].

NON-INFECTIOUS CAUSES

Primary umbilical torsion is the most commonly diagnosed condition of the non-infectious causes of abortion[3].

Abortion Due to Twinning

It is well known that the birth of healthy twin foals is unusual. It is generally accepted that the inability of a mare to successfully carry twin foals to term is due to placental insufficiency. In other words, insufficient fetal membranes are produced to accommodate and provide nutrition to two developing feti. There is a greater possibility of twin conception towards the end of the breeding season and the incidence of twins is higher in young mares. With the common use of ultrasound in equine practice, twin pregnancies are now commonly detected early and dealt with.

Abortion Due to Progesterone Deficiency

Progesterone is the hormone whose function is to prepare the uterus for the reception and development of the fertilized egg. In most animals, this hormone is produced primarily in a structure known as the "corpus luteum of pregnancy." This structure forms at the location of the follicle that ruptured releasing the egg, which was fertilized at conception. The corpus luteum is composed of specialized cells that produce progesterone. In the horse, the corpus luteum of pregnancy produces enough progesterone to maintain pregnancy for only 40 to 50 days. At about this time, structures known as "endometrial cups" develop in the uterus. These structures secrete a hormone known as gonadotropin that stimulates the ovaries to produce more eggs, resulting in the formation of more corpora lutea. These newly formed corpora lutea produce the progesterone required to maintain pregnancy into the fourth or fifth month of gestation. At this stage, the placenta takes over production of progesterone to term. Abortions at the fourth or fifth month of pregnancy are often attributed to a lack of sufficient hormones to maintain pregnancy. Whether this is true is open for debate. Many mares are treated with synthetic progesterone (Regu-Mate®) to help maintain a pregnancy.

Umbilical Cord Torsion

Torsion, or strangulation of the umbilical cord, is said to be the cause of fetal deaths and abortions in the later stages of pregnancy. The cord normally has three clockwise turns. In a few cases, excessive twisting or wrapping around the limb of the fetus shuts off the flow of blood in the cord, resulting in the death of the fetus. Umbilical torsion was observed in 19% of 515 cases submitted to the Animal Health Laboratory over six breeding seasons[3].

Congenital Defects

In recent years, mares are being diagnosed pregnant with the ultrasound by day 15 of gestation. Before the common use of the ultrasound, early embryonic deaths would be mistaken for failure of conception followed by silent heat. Many of these early embryonic deaths have genetic or chromosomal defects that lead to improper development of the embryo and subsequent rejection by the dam.

OTHER CAUSES

Ergot Alkaloid Toxicity in the Late-Gestation Mare

A number of fungi, both saprophytic and endophyte, can produce mycotoxins in the class of chemicals called ergot or, more specifically, ergopeptine alkaloids. Mares are sensitive to ergopeptine alkaloids at levels as low as 50–100 ppb, while cattle do not show visible signs until 1,000–2,000 ppb. These alkaloids exert toxic effects on the reproductive tract and mammary gland of the mare and have been associated with depression of serum

prolactin and progestagens (5 alpha-pregnanes), a prolonged gestation, a thickened edematous placenta and agalactia[7]. The ergopeptine alkaloids interfere with the normal rise of progestagens (mainly 5 alpha-pregnanes) and prolactin in the last 40 days of gestation. The progestagen levels normally increase from 300 days to birth (4.8 ± 1.5 to 22.7 ± 2.7 ng/mL). Foals born without the normal increases in maternal progestagens suffer hypoadrenocortical function and are small, weak or stillborn[7].

Fescue Toxicity is the form of ergot alkaloid toxicity that has been widely seen in the U.S. It is caused by the endophytic fungus *Neotyphodium coenophialum* (formerly called *Acremonium coenophialum)*. It lives inside the plant and produces ergot alkaloids (primarily ergovaline), resulting in the disease condition called fescue toxicity. These chemicals cause dystocia in mares and deaths of foals. The primary clinical signs of ergot alkaloid poisoning in the late-gestation mare include:

- an extended gestation length from 11 to 12 months;
- dystocia, with mares sometimes trying to foal for many hours;
- agalactia (little or no milk) with poor quality colostrum (low immunoglobulin levels);
- "red bag" placentas from premature separation;
- thick edematous placentas with weights exceeding 6.5 kg for a thoroughbred mare;
- weak or dead foals with aspiration pneumonia from struggling to get out through a thickened placenta.

Endophyte-free varieties of fescue have been developed to get away from the problems caused by these mycotoxins. Endophyte-infected varieties of fescues are commonly used for erosion control and golf greens. Occasionally, endophyte-infected seed will be accidentally sold to horse owners.

Ergotism is the clinical syndrome caused by the genera, *Claviceps*. It is a saprophytic fungus that lives on the plant, utilizing the plant's nutrients without a recognizable benefit to the host. *Claviceps* can live on a variety of hays and pasture grasses and produce fruiting bodies on bluegrass and cereal rye. The *Claviceps* sclerotia (fruiting bodies) contain a large array of ergopeptine alkaloids similar to those seen in fescue toxicity. During the 1999 foaling season in Ontario, seven perinatal foals died when their dams consumed cereal-rye-straw bedding. The mares had thickened edematous placentas and agalactia.

Mare Reproductive Loss Syndrome

Mare reproductive loss syndrome is a term given to the syndrome that resulted in the loss of hundreds of foals (approx. 500) and spontaneous abortion in mares in central Kentucky and parts of Ohio in the spring of 2001.

Evidence points to the setae (hair-like projections) of Eastern tent caterpillars as the primary cause of the problem. They can become imbedded in the submucosal lining of the gastrointestinal tract and cause areas of inflammation and an entrance for bacteria. These bacteria can then enter the blood stream and localize in the placenta and fetus, resulting in abortion[8].

Nutritional Deficiencies

Nutritional deficiencies have not been associated with abortion in mares. In general, if mares are in good condition (body condition of greater than 2 on a scale of 0 to 5, where 5 is very fat), they will carry a foal. Mares that are too thin, however, will not cycle or conceive.

GENERAL COMMENTS

Certain drugs (e.g., corticosteroids) have been reported to cause abortion in mares. These reports have seldom been substantiated. Examine drug labels to see whether administration to pregnant animals is contraindicated.

In spite of common beliefs, injury seldom causes abortion. Experimental rough manual manipulation of the pregnant uterus has not caused abortion or embryonic death.

Only 40% of the equine abortion cases submitted to veterinary diagnostic laboratories are diagnosed. Aborted foals and their placentas should be submitted to a laboratory as quickly as possible to help improve the success rate of diagnosis. In most cases, little can be done in the current breeding season, but a course of action to prevent losses in other mares or in subsequent seasons can be determined.

FOR FURTHER INFORMATION

For more information on Regu-Mate®, see the information sheet *Preventing Accidental Exposure to Regu-Mate® and Procedures for Safe Handling* under "Horses" in the Livestock section of the OMAFRA website.

For further information, see the article *Ergot Alkaloid (ergopeptine) Toxicity in Horse Hay and Pasture* under "Horses" in the Livestock section of the OMAFRA website.

For information on the reproductive system and hormonal controls, see the OMAFRA Factsheet *Horse Management: Anatomy and Physiology of Reproduction in the Mare,* Order No. 88-060.

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